UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/071,809	02/07/2002	Tinghao F. Wang	10200-16	9444

43320 7590 06/16/2005

EVAN LAW GROUP LLC
566 WEST ADAMS, SUITE 350
CHICAGO, IL 60661

EXAMINER	
DEO, DUY VU NGUYEN	
ART UNIT	**PAPER NUMBER**
1765	

DATE MAILED: 06/16/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents
United States Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450
www.uspto.gov

BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/071,809
Filing Date: February 07, 2002
Appellant(s): WANG, TINGHAO F.

Jonathan M. Blanchard
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 3/21/05.

(1) Real Party in Interest

A statement identifying the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings, which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of the claims contained in the brief is correct.

(4) Status of Amendments After Final

No amendment after final has been filed.

(5) Summary of Claimed Subject Matter

The summary of invention contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The rejection of claims 1, 3-12, 14, 15, 21, 27 over Tabara et al. (US 6,150,250) and Tsai (US 5,880,033) has been withdrawn in order to simplify the issues on appeal.

Appellant's statement of the grounds of rejection is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

The following is a listing of the evidence relied upon in the rejection of claims under appeal.

5,880,033 Tsai et al. 3-1999

Langley et al., One-Chamber Polycide Sandwich Etching, Semiconductor International, October 1989.

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claims 1, 3-12, 14, 15, 21, 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tsai (US 5,880,033).

Tsai describes a method of etching metal silicide (WSi) using Cl2 and O2. The pressure is ranging from 2-20 mTorr, 4 mTorr is used in the example. The first power is about 200-2000 watts, and second power (bias power) is about 5-500 watts. The Cl2 flow rate is about 20-800 sccm, and O2 flow rate is about 1-50 sccm (summery; col. 4, line 14-15; col. 5, line 1-25; col. 7, line 10-25, line 50-col. 8.) Unlike claimed invention, Tsai doesn't describe the claimed O2 concentration of 25 % V or greater, such as 25-30% V. However, he shows a O2 high flow rate

or concentration (concentration of etchant would be proportional to the flow rate), are desirable, an increase in O2 flow rate from 0 to 10 sccm increases the WSi etch rates from 250 nm/min to 350 nm/min; he also teaches the power ratio of the first power to the second power is selected to enhance the ability of the etchant plasma to anisotropically etch the metal silicide layer and the flow rates are dependent upon the size of the process chamber. Therefore, it would have been obvious for one skill in the art through routine experimentation to determine the optimum parameters such as flow rates power level in order to etch WSi with high etch rate and high selectively to the under polysilicon layer, such as 30 or more, with an anticipation of an expected result.

Concerning to claims 10 and 11, the time to completely etch WSi would have been obviously depending on other factors such as WSi thickness and parameters. A 30 seconds time period would be achievable since Tsai's parameters are overlap claimed parameters.

Claims 22, 23, 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tsai as applied to claims 1 and 21 above, and further in view of Langley et al. (Semiconductor International, October 1989).

Unlike claims 22, 23, and 25, Tsai doesn't describe a breakthrough etch using gas comprising CF4. Langley teaches method of etching silicide/poly wherein he teaches etching a native oxide on the silicide using a gas comprising CF4 (pg. 97, 1st col., 2nd paragraph) before etching the silicide. This would reads on claimed breakthrough etch. It would have been obvious at the time of the invention for one skill in the art to modify Tsai in light of Langley in order to remove a native oxide on the silicide before etching of the silicide.

(10) Response to Argument

Appellant's argument that Tsai teaches away from higher O2 concentrations because he teaches that "excessively high flow rates of oxygen can cause more isotropic etching of the substrate...and can also result in excessively low dielectric etch rate" is not persuasive because this doesn't relate to the etch rates of the metal silicide and the polysilicon. Furthermore, there is no teaching by Tsai that excessively high would be 25% or greater.

Appellant's argument about figures 4 and 5 is noted; however, it is found unpersuasive because, first of all, there is no percentage of O2 concentrations described in these figures. These figures show the polysilicon etch rate changes with the N2 concentration (fig. 4), not with the O2 concentration, and the selectivity of metal silicide vs. polysilicon changes with the N2 concentration (fig. 5), not with the O2 concentration. But most importantly, Tsai teaches that in figure 4 "the polysilicon etch rate is lowered for increasing flow rates of O2" (col. 7, line 64-65). Concerning figure 5, Tsai teaches that the etching selectivity ratios of WSi vs. polysilicon increases for increasing of flow rates O2 (col. 8, line 1-8). Also he teaches of Cl2 range at 20-800 sccm and O at 1-50 sccm (col. 8, lines 24-33). These ranges would certainly include claimed of O2 concentration of over 25% by V. Therefore, these range would include claimed ratio etch rate of at least 30. Tsai further teaches as the O2 flow rate increases, the metal silicide etching rate also increases and decreases poly-Si etching rate; therefore increasing the selectivity of the metal silicide over the poly-Si (col. 7, lines 50-col. 8, line 8). Therefore, it would be obvious for one skilled in the art to determine the O2 concentration through routine experimentation in order to provide optimum concentration to etch the metal silicide against the polysilicon.

Concerning appellant's argument that the claim is differentiated from Tsai through the exclusion of N2, the claim language of comprising doesn't exclude N2 or any other gas. Therefore, the claim language doesn't express "increase in the O2 concentration of the etchant gas in the absence of N2 could successfully provide increase in etching selectivity."

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

Primary Examiner
Duy-Vu N. Deo
June 13, 2005

Conferees
Glenn Caldarola
Norton Nadine
Nadine Norton - Home SPE 1765

EVAN LAW GROUP LLC
566 WEST ADAMS, SUITE 350
CHICAGO, IL 60661